IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Docket No.: **TI-35237**
Anand G. Dabak	Examiner: **Phan, Man U**
Serial No.: **10/649,260**	Art Unit: **2419**
Filed: **08/25/2003**	Conf. No.: **7206**

For: **MULTI-CARRIER RECEPTION FOR ULTRA-WIDEBAND (UWB) SYSTEMS**

APPELLANTS' BRIEF – 37 C.F.R. § 41.37

Commissioner for Patents
Alexandria, VA 22313-1450

Dear Sir:

This Appeal Brief is submitted in connection with the above-identified application in response to the final Office Action dated November 26, 2008.

I. REAL PARTY IN INTEREST

Texas Instruments Incorporated is the real party in interest.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any pending appeals in related applications.

III. STATUS OF CLAIMS

Claims 1-26 are pending in the application. Claims 14, 15, 24 and 26 are allowed. Final Rejection of Claims 1-13, 16-23 and 25 was made by the Examiner in the Office Action dated November 26, 2008. Claims 1-13, 16-23 and 25 are on appeal. Claims 1-13, 16-23 and 25 are reproduced in the Appendix to Appellants' Brief filed herewith.

IV. STATUS OF AMENDMENTS

All amendments have been entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

A system and method for receiving transmissions in a wireless communications system in which, in a preferred embodiment, a receiver (such as receiver 400) can despread and then demodulate a symbol from a transmitter that first spread and them modulated the symbol. By reversing the processing order, the demodulation can be performed at a lower data rate thereby reducing computational and power requirements. More specifically:

Independent Claim 1 requires and positively recites, a method comprising: "receiving a symbol, wherein the symbol is first spread with a spreading code used to spread all symbols to be transmitted and then modulated ([0037] lines 1-6; [0038] lines 1-4)", "stripping redundancy from

the symbol after the receiving the symbol ([0040] lines 6-12)", "despreading the symbol after the stripping the redundancy from the symbol ([0041] lines 1-5)" and "orthogonal frequency division multiplexing (OFDM) demodulating the symbol ([0042] lines 1-9)".

Claim 2 further defines the method of claim 1, wherein the symbol is transmitted over-the-air ([0034] lines 9-11; [0035] lines 1-15; [0036] lines 1-11).

Claim 3 further defines the method of claim 1, wherein the symbol comprises a data symbol, a cyclic redundancy, and at least one replicated symbol ([0035] lines 8-12; [0036] lines 1-11), and wherein the stripping comprises: removing replicated symbols ([0040] lines 6-9); and eliminating a cyclic redundancy ([0040] lines 7-9).

Claim 4 further defines the method of claim 3, wherein the removing comprises coherently combining the replicated symbol with the data symbol and the cyclic redundancy ([0040] lines 5-12).

Claim 5 further defines the method of claim 4, wherein the replicated symbol is a copy of the data symbol and the cyclic redundancy ([0040] lines 6-8).

Claim 6 further defines the method of claim 3, wherein the eliminating comprises discarding of the cyclic redundancy ([0040] lines 8-10; [0041] lines 1-2).

Claim 7 further defines the method of claim 1, wherein the despreading comprises applying a spreading code to the symbol ([0047] lines 1-3).

Claim 8 further defines the method of claim 7, wherein the symbol comprises a data symbol, a cyclic redundancy, and at least one replicated symbol, and wherein the spreading code is applied to the data symbol [0040] line 5 – [0041] line 5).

Claim 9 further defines the method of claim 7, wherein the spreading code applied to the symbol is a copy of a spreading code applied to the symbol at a transmitter ([0041] lines 1-8).

Claim 10 further defines the method of claim 1, wherein the modulation applied to the symbol is orthogonal frequency division multiplexing (OFDM)(0041] lines 1-5).

Claim 11 further defines the method of claim 10, wherein the demodulating comprises applying a Fourier transform to the symbol ([0042] lines 2-5).

Claim 12 further defines the method of claim 11, wherein the Fourier transform is a Fast Fourier Transform ([0042] lines 3-5).

Claim 13 further defines the method of claim 1, wherein at a transmitter, the spreading code is applied to symbols on a symbol by symbol basis prior to transmission ([0035] lines 1 – [0036] line 11).

Independent Claim 16 requires and positively recites, a receiver (Fig. 4, (400)) comprising: "an analog section (Fig. 4, (405)) coupled to a signal input, the analog section containing circuitry to filter and amplify a signal received at the signal input ([0038] lines 1-4; [0039] lines 1-8)", "an analog-to-digital converter (ADC)(Fig. 4, (422)) coupled to an output of the analog section, the ADC to convert an output of the analog section into a digital symbol stream ([0040] lines 1-5)" and "a digital section coupled to an output of the ADC, the digital section comprising: a redundancy elimination circuit (REC)(Fig. 4, (424)) coupled to the ADC, the REC containing circuitry to remove redundancies inserted into a digital symbol ([0040] lines 6-12); a despreader (Fig. 4, (426)) coupled to an output of the REC, the despreader containing circuitry to apply a second spreading code to a digital symbol, one digital symbol at a time ([0054] lines 1-9); and an orthogonal frequency division multiplexing (OFDM) demodulator coupled to an output of the despreader, the demodulator containing circuitry to remove modulation applied to the digital symbol ([0042] lines 1-9)".

Claim 17 further defines the receiver of claim 16, wherein at a transmitter, symbols to be transmitted are first spread with a first spreading code and then modulated ([0030] line 1 – [0032] line 8).

Claim 18 further defines the receiver of claim 17, wherein at the transmitter, each symbol is spread with the first spreading code ([0030] lines 1-8).

Claim 19 further defines the receiver of claim 17, wherein the second spreading code is a copy of the first spreading code ([0041] lines 1-8).

Claim 20 further defines the receiver of claim 16, wherein the REC contains circuitry to remove replicated symbols and cyclic redundancies ([0040] lines 6-12).

Claim 21 further defines the receiver of claim 16, wherein at a transmitter, symbols to be transmitted are modulated using orthogonal frequency division multiplexing (OFDM)([0030] lines 3-8), and wherein the demodulator applies a Fourier transform to the digital symbol ([0042] lines 2-5).

Claim 22 further defines the receiver of claim 21, wherein the Fourier transform is a Fast Fourier Transform ([0042] lines 2-5).

Claim 23 further defines the receiver of claim 16, wherein the digital section further comprises an error correcting code decoder coupled to the demodulator, the error correcting code decoder containing circuitry to remove an error correcting code applied to the digital symbol (Fig. 4; [0040] lines 1-3; [0042] line 1 – [0043] line 7).

Claim 25 further defines the receiver of claim 16, wherein the receiver is part of an ultra-wideband (UWB) communications system (Fig. 4, (400); [0037] lines 1-5).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Are Claims 1-13, 16-23 and 25 patentable under 35 U.S.C. 103(a) over Nakamura et al. (U.S. 6,920,173) in view of Kim (US 6,810,007)?

VII. ARGUMENTS

Claims 1-13, 16-23 and 25 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura et al. (U.S. 6,920,173) in view of Kim (US 6,810,007). Appellants respectfully traverse this rejection, as set forth below.

In proceedings before the Patent and Trademark Office, "the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art". In re Fritch, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992) (citing In re Piasecki, 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984). "The Examiner can satisfy this burden **only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references**", In re Fritch, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992)(citing In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988)(citing In re Lalu, 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1988)).

Similarly, although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. **The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.** In re Gordon, 733 F.2d at 902, 221 USPQ at 1127. Moreover, **it is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious.** In re Gorman, 933

F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed.Cir.1991). See also Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1138, 227 USPQ 543, 547 (Fed.Cir.1985).

Furthermore, "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

Independent Claim 1 requires and positively recites, a method comprising: "receiving a symbol, wherein the symbol is first spread with a spreading code used to spread all symbols to be transmitted and then modulated", "stripping redundancy from the symbol after the receiving the symbol", "**despreading the symbol after the stripping the redundancy from the symbol**" **AND** "**orthogonal frequency division multiplexing (OFDM) demodulating the symbol**".

Independent Claim 16 requires and positively recites, a receiver comprising: "an analog section coupled to a signal input, the analog section containing circuitry to filter and amplify a signal received at the signal input", "an analog-to-digital converter (ADC) coupled to an output of the analog section, the ADC to convert an output of the analog section into a digital symbol stream" and "a digital section coupled to an output of the ADC, the digital section comprising: a redundancy elimination circuit (REC) coupled to the ADC, the **REC containing circuitry to remove redundancies inserted into a digital symbol; a despreader coupled to an output of the REC**, the despreader containing circuitry to apply a second spreading code to a digital symbol, one digital symbol at a time; **AND** "**an orthogonal frequency division multiplexing (OFDM) demodulator coupled to an output of the despreader**, the demodulator containing circuitry to remove modulation applied to the digital symbol".

In contrast, Nakamura discloses a CDMA system having despreader 201 followed by demodulator 2002 (Fig. 1; col. 1, lines 23-26; col. 12, lines 47-52; col. 17, lines 27-30). Nakamura's demodulator 202 employs a standard demodulation technique, such as BPSK, for "demodulating '1', '0' of user data and control data on the basis of the resulting of dispreading"

(col. 12, lines 47-52). Examiner admits that Nakamura does not teach or suggest, "the redundancy elimination circuit coupled to the ADC for removing of cyclic prefix" (OA, page 7, lines 1-2). As such, Examiner admits that Nakamura fails to teach or suggest, "**despreading the symbol after the stripping the redundancy from the symbol**", as required by Claim 1 AND "a redundancy elimination circuit (REC) coupled to the ADC, the **REC containing circuitry to remove redundancies inserted into a digital symbol; a despreader coupled to an output of the REC**", as required by Claim 16.

Nakamura similarly fails to teach or suggest any form of orthogonal frequency division multiplexing (OFDM). As such, Nakamura similarly fails to teach or suggest, "**orthogonal frequency division multiplexing (OFDM) demodulating the symbol**", as required by Claim 1, AND "**an orthogonal frequency division multiplexing (OFDM) demodulator coupled to an output of the despreader**, the demodulator containing circuitry to remove modulation applied to the digital symbol", as required by Claim 16. Examiner, however, cites Kim as teaching an orthogonal frequency division multiplexing (OFDM) transmission/receiving system and a block encoding method therefore (OA, page 7, lines 10-11. But while Kim discloses an OFDM system having an FFT 113 for OFDM followed by a Q-ary demodulator 114 (Fig. 1B, col. 3, lines 39-45), Kim's Q-ary demodulator 114 employs a standard demodulation technique, such as QPSK or QAM (col. 3, lines 21-29).

There is no teaching or suggestion of performing OFDM in Nakamura. There is no teaching or suggestion of performing dispreading in Kim. Thus, there is no teaching or suggestion in Nakamura and Kim that the two different systems of Nakamura and Kim could be combined in the first place, much less operate as a combined functional system.

Examiner, however, has determined:

> One skilled in the art of communications would recognize **"the need"** for a novel system and method for a novel system and method for receiving OFDM transmission in spread spectrum signal receiver, and would apply Kim's novel use

> of a redundancy elimination circuit coupled to the ADC for removing of cyclic prefix into Nakamura's method for receiving a spread spectrum signal and demodulating transmit data from the signal. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to apply Kim's OFDM transmission/receiving system and block encoding method therefore into Nakamura's spread spectrum signal receiver apparatus and interference cancellation apparatus with the motivation being to provide a system and method for a multi carrier reception for UWB systems (OA, page 8, line 15 – page 9, line 2).

Examiner, however, cites no evidence from the prior art supporting his assertion that "one having ordinary skill in the art" WOULD RECOGNIZE "**the need**" for a novel system and method for a novel system and method for receiving OFDM transmission in spread spectrum signal receiver". Examiner points to no authority, other than Appellants' specification, for his determination above. Examiner's determination, however, is supposition not supported by fact – little more than improper hindsight reconstruction derived from improper reliance by Examiner on the teaching of Appellants' specification. As such, Examiner's determination is improper and must be reversed or supported by proper evidence.

Moreover, any statement by Examiner that modifications of the prior art to meet the claimed invention would have been "well within the ordinary skill of the art at the time the claimed invention was made" because the references relied upon teach that all aspects of the claimed invention were individually known in the art", is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000) (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention); *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999) (The level of skill in the art cannot be relied upon to provide the suggestion to combine references).

In addition to the above, even if, arguendo, there had been motivation for one having ordinary skill in the art to combine Nakamura and Kim (which Examiner has not shown), there is clearly no teaching or suggestion from Nakamura or Kim that would lead to the order of performing the OFDM an dispreading functions as recited in Claims 1 and 16, without undue experimentation. While BPSK, QPSK and QAM modulation techniques might be interchangeable within or between systems, OFDM performs a very different type of function from these modulations techniques, and therefore it would not have been obvious to one of ordinary skill in the art at the time the invention was made to combine the two references to implement OFDM in a CDMA system utilizing BPSK. And it clearly would not have been obvious to combine them in a very specific manner such that OFDM is performed after dispreading in a receiver. Appellants discovered that performing OFDM after dispreading reduces the number of computations required, thus resulting in a significant power savings. There is simply no corresponding teaching in Nakamura or Kim, alone or in combination, with or without the knowledge available to one having ordinary skill in the art at the time of the invention, that would have led one having ordinary skill in the art to have arrived at the invention of Claims 1 and 16, without reference to the present specification and without undue experimentation. Accordingly, for all the reasons set forth above, the 35 U.S.C. 103(a) of Claims 1 and 16 is improper and must be reversed.

Claims 2-13, 17-23 and 25 stand allowable as depending from allowable claims and including further limitations not taught or suggested by the references of record.

Claim 2 further defines the method of claim 1, wherein the symbol is transmitted over-the-air. Claim 2 depends from Claim 1 and is allowable for the same reasons set forth above in support of the allowance of Claim 1.

Claim 3 further defines the method of claim 1, wherein the symbol comprises a data symbol, a cyclic redundancy, and at least one replicated symbol, and wherein the stripping comprises: "removing replicated symbols" and "eliminating a cyclic redundancy". Claim 3

depends from Claim 1 and is allowable for the same reasons set forth above in support of the allowance of Claim 1.

Claim 4 further defines the method of claim 3, wherein the removing comprises coherently combining the replicated symbol with the data symbol and the cyclic redundancy. Claim 4 depends from Claim 3 and is allowable for the same reasons set forth above in support of the allowance of Claim 3.

Claim 5 further defines the method of claim 4, wherein the replicated symbol is a copy of the data symbol and the cyclic redundancy. Claim 5 depends from Claim 4 and is allowable for the same reasons set forth above in support of the allowance of Claim 4.

Claim 6 further defines the method of claim 3, wherein the eliminating comprises discarding of the cyclic redundancy. Claim 6 depends from Claim 3 and is allowable for the same reasons set forth above in support of the allowance of Claim 3.

Claim 7 further defines the method of claim 1, wherein the despreading comprises applying a spreading code to the symbol. Claim 7 depends from Claim 1 and is allowable for the same reasons set forth above in support of the allowance of Claim 1.

Claim 8 further defines the method of claim 7, wherein the symbol comprises a data symbol, a cyclic redundancy, and at least one replicated symbol, and wherein the spreading code is applied to the data symbol. Claim 8 depends from Claim 7 and is allowable for the same reasons set forth above in support of the allowance of Claim 7.

Claim 9 further defines the method of claim 7, wherein the spreading code applied to the symbol is a copy of a spreading code applied to the symbol at a transmitter. Claim 9 depends from Claim 7 and is allowable for the same reasons set forth above in support of the allowance of Claim 7.

Claim 10 further defines the method of claim 1, wherein the modulation applied to the symbol is orthogonal frequency division multiplexing (OFDM). Claim 10 depends from Claim 1 and is allowable for the same reasons set forth above in support of the allowance of Claim 1.

Claim 11 further defines the method of claim 10, wherein the demodulating comprises applying a Fourier transform to the symbol. Claim 11 depends from Claim 10 and is allowable for the same reasons set forth above in support of the allowance of Claim 10.

Claim 12 further defines the method of claim 11, wherein the Fourier transform is a Fast Fourier Transform. Claim 12 depends from Claim 11 and is allowable for the same reasons set forth above in support of the allowance of Claim 11.

Claim 13 further defines the method of claim 1, wherein at a transmitter, the spreading code is applied to symbols on a symbol by symbol basis prior to transmission. Claim 13 depends from Claim 1 and is allowable for the same reasons set forth above in support of the allowance of Claim 1.

Claim 17 further defines the receiver of claim 16, wherein at a transmitter, symbols to be transmitted are first spread with a first spreading code and then modulated. Claim 17 depends from Claim 16 and is allowable for the same reasons set forth above in support of the allowance of Claim 16.

Claim 18 further defines the receiver of claim 17, wherein at the transmitter, each symbol is spread with the first spreading code. Claim 18 depends from Claim 17 and is allowable for the same reasons set forth above in support of the allowance of Claim 17.

Claim 19 further defines the receiver of claim 17, wherein the second spreading code is a copy of the first spreading code. Claim 19 depends from Claim 17 and is allowable for the same reasons set forth above in support of the allowance of Claim 17.

Claim 20 further defines the receiver of claim 16, wherein the REC contains circuitry to remove replicated symbols and cyclic redundancies. Claim 20 depends from Claim 16 and is allowable for the same reasons set forth above in support of the allowance of Claim 16.

Claim 21 further defines the receiver of claim 16, wherein at a transmitter, symbols to be transmitted are modulated using orthogonal frequency division multiplexing (OFDM), and wherein the demodulator applies a Fourier transform to the digital symbol. Claim 21 depends from Claim 16 and is allowable for the same reasons set forth above in support of the allowance of Claim 16.

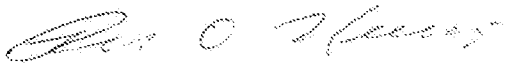
Claim 22 further defines the receiver of claim 21, wherein the Fourier transform is a Fast Fourier Transform. Claim 22 depends from Claim 21 and is allowable for the same reasons set forth above in support of the allowance of Claim 21.

Claim 23 further defines the receiver of claim 16, wherein the digital section further comprises an error correcting code decoder coupled to the demodulator, the error correcting code decoder containing circuitry to remove an error correcting code applied to the digital symbol. Claim 23 depends from Claim 16 and is allowable for the same reasons set forth above in support of the allowance of Claim 16.

Claim 25 further defines the receiver of claim 16, wherein the receiver is part of an ultra-wideband (UWB) communications system. Claim 25 depends from Claim 16 and is allowable for the same reasons set forth above in support of the allowance of Claim 16.

For the above reasons, favorable consideration of the appeal of the Final Rejection in the above-referenced application, and its reversal, are respectfully requested.

Respectfully submitted,



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CLAIMS APPENDIX

CLAIM ON APPEAL:

1. A method comprising:

receiving a symbol, wherein the symbol is first spread with a spreading code used to spread all symbols to be transmitted and then modulated;

stripping redundancy from the symbol after the receiving the symbol;

despreading the symbol after the stripping the redundancy from the symbol; and

orthogonal frequency division multiplexing (OFDM) demodulating the symbol.

2. The method of claim 1, wherein the symbol is transmitted over-the-air.

3. The method of claim 1, wherein the symbol comprises a data symbol, a cyclic redundancy, and at least one replicated symbol, and wherein the stripping comprises:

removing replicated symbols; and

eliminating a cyclic redundancy.

4. The method of claim 3, wherein the removing comprises coherently combining the replicated symbol with the data symbol and the cyclic redundancy.

5. The method of claim 4, wherein the replicated symbol is a copy of the data symbol and the cyclic redundancy.

6. The method of claim 3, wherein the eliminating comprises discarding of the cyclic redundancy.

7. The method of claim 1, wherein the despreading comprises applying a spreading code to the symbol.

8. The method of claim 7, wherein the symbol comprises a data symbol, a cyclic redundancy, and at least one replicated symbol, and wherein the spreading code is applied to the data symbol.

9. The method of claim 7, wherein the spreading code applied to the symbol is a copy of a spreading code applied to the symbol at a transmitter.

10. The method of claim 1, wherein the modulation applied to the symbol is orthogonal frequency division multiplexing (OFDM).

11. The method of claim 10, wherein the demodulating comprises applying a Fourier transform to the symbol.

12. The method of claim 11, wherein the Fourier transform is a Fast Fourier Transform.

13. The method of claim 1, wherein at a transmitter, the spreading code is applied to symbols on a symbol by symbol basis prior to transmission.

16. A receiver comprising:

an analog section coupled to a signal input, the analog section containing circuitry to filter and amplify a signal received at the signal input;

an analog-to-digital converter (ADC) coupled to an output of the analog section, the ADC to convert an output of the analog section into a digital symbol stream; and

a digital section coupled to an output of the ADC, the digital section comprising

a redundancy elimination circuit (REC) coupled to the ADC, the REC containing circuitry to remove redundancies inserted into a digital symbol;

a despreader coupled to an output of the REC, the despreader containing circuitry to apply a second spreading code to a digital symbol, one digital symbol at a time; and

an orthogonal frequency division multiplexing (OFDM) demodulator coupled to an output of the despreader, the demodulator containing circuitry to remove modulation applied to the digital symbol.

17. The receiver of claim 16, wherein at a transmitter, symbols to be transmitted are first spread with a first spreading code and then modulated.

18. The receiver of claim 17, wherein at the transmitter, each symbol is spread with the first spreading code.

19. The receiver of claim 17, wherein the second spreading code is a copy of the first spreading code.

20. The receiver of claim 16, wherein the REC contains circuitry to remove replicated symbols and cyclic redundancies.

21. The receiver of claim 16, wherein at a transmitter, symbols to be transmitted are modulated using orthogonal frequency division multiplexing (OFDM), and wherein the demodulator applies a Fourier transform to the digital symbol.

22. The receiver of claim 21, wherein the Fourier transform is a Fast Fourier Transform.

23. The receiver of claim 16, wherein the digital section further comprises an error correcting code decoder coupled to the demodulator, the error correcting code decoder containing circuitry to remove an error correcting code applied to the digital symbol.

25. The receiver of claim 16, wherein the receiver is part of an ultra-wideband (UWB) communications system.

EVIDENCE APPENDIX

No documents are being submitted with the Appeal Brief.

RELATED PROCEEDINGS APPENDIX

Appellants are unaware of any pending appeals in related applications.